REMARKS

Reconsideration of this application is respectfully requested in view of the following remarks.

Claims 1-34 are currently pending in the application and subject to examination.

Finality of the Office Action

The Applicants filed a Petition under 37 C.F.R. §1.181, to vacate the finality of the Office Action mailed April 12, 2006 on June 8, 2006. The following arguments were presented in the Petition filed on June 8, 2006, to which no response has yet been received. Thus, the arguments are repeated here.

In the non-final Office Action issued for the instant application on July 19, 2005, claim 5 was objected to for a grammatical error and claims 1-13, 15-30 and 32-34 were rejected under 35 U.S.C. § 103(a) as being unpatentable over "Object-Oriented Modeling for Gasoline Engine and Automatic Transmission Systems," by K. Hong, et al., 1998 (hereinafter, "Hong") in view of Iizuka (U.S. Patent No. 5,885,188, hereinafter "Iizuka").

In the Amendment filed October 17, 2005, in Response to the July 19, 2005, Office Action, claim 5 was amended to correct the grammatical error. Specifically, claim 5 was amended to recite, in part, "include at least one" instead of - - include at one - -. No other amendments were made.

A final Office Action was issued in the instant application on January 10, 2006. The final Office Action contained numerous errors; thus, the Applicants' representative initiated a telephone interview with Supervisory Primary Examiner Kaman Shah on February 6, 2006. It was agreed that the Final Office Action would be withdrawn and a

new, non-final Office Action would be issued. On March 12, 2006, the outstanding final Office Action was issued. The Office Action was made final, despite the Examiner's statement on page 2, paragraph 2, that the finality of the Office Action mailed January 10, 2006, had been rescinded in view of arguments presented to SPE Shaw by the Applicant.

Moreover, the Office Action was made final, despite that the Examiner cited a new reference, viz "Design of Computer Experiments for Open-Loop Control and Robustness Analysis of Clutch to Clutch Shifts in Automatic Transmission" by Albert Yoon et al. (hereinafter, "Yoon"). With the exception of the grammatical amendment to claim 5 noted above, the Applicants did not amend the claims in response to the Office Action dated July 19, 2005. Therefore, the "Applicant's amendment" could not, and did not, "necessitate the new ground(s) of rejection," as asserted by the Examiner in the outstanding Office Action. See, Office Action of March 12, 2006, page 31, paragraph 12. Accordingly, the Applicant submits that the finality of the outstanding Office Action is premature, and withdrawal of the finality is respectfully requested.

Rejections Under 35 U.S.C. § 103(a)

In the outstanding Office Action, claims 1-6 were rejected under 35 U.S.C. § 103(a) as being unpatentable over "Object-Oriented Modeling for Gasoline Engine and Automatic Transmission Systems," by K. Hong, et al., 1998 (hereinafter, "Hong") in view of Iizuka (U.S. Patent No. 5,885,188, hereinafter "Iizuka"). Claims 7-34 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hong in view of Iizuka and further in view of "Design of Computer Experiments for Open-Loop Control and Robustness

Analysis of Clutch to Clutch Shifts in Automatic Transmission" by Albert Yoon et al. (hereinafter, "Yoon"). The Applicants respectfully traverse the rejections, as follows.

Claim 1

In the Applicants' invention as recited in claim 1, a control system design tool is connected to a shift controller stored in a shift controller of an automatic transmission mounted on a vehicle. The control system design tool inputs a shift control algorithm and outputs a hydraulic pressure supply command such that the hydraulic pressure supply command is supplied to a hydraulic actuator of the vehicle through a hydraulic circuit based on a shift signal from the shift control algorithm. A first simulator section is connected to the control system design tool for inputting the hydraulic pressure supply command and for estimating an effective hydraulic pressure generated in the hydraulic actuator in response to the hydraulic pressure supply command based on a first model. A second simulator section is connected to the control system design tool and to the first simulator section for determining transfer functions of a second model describing behavior of the hydraulic actuator such that an output of the second model converges with the estimated effective hydraulic pressure. The second simulator section simulates and evaluates the shift control algorithm based on a third model obtained by incorporating the second model with the first model.

Hong teaches a computer model for control system design of engines having automatic transmissions. However, Hong teaches simulation, only. Hong does not disclose or suggest a shift controller mounted on a vehicle and having a shift control algorithm stored therein, as recited in claim 1. Similarly, Hong fails to disclose or

suggest a hydraulic actuator transmitting power generated by the internal combustion engine to drive wheels, as recited in claim 1.

In addition, the Office Action asserts that Hong discloses a control system design tool connected to a shift controller of an automobile for inputting the shift control algorithm and for outputting a hydraulic pressure supply command such that the hydraulic pressure supply command is supplied to the hydraulic actuator through the hydraulic circuit based on a shift signal from shift control algorithm by "MATLAB/SIMULINK Tool (Hong 1998: Pg. 109, Abstract) which can be connected to the shift controller (Hong 1998: Page 108, 3rd Paragraph) to input the algorithm which outputs the hydraulic pressure supply command based on the algorithm (Hong 1998: Pg. 109, Abstract). The hydraulic circuits & actuator are taught by Hong as disclosed (Hong: Fig.1 Element 20, 23-25)." *Office Action*, p. 12, lines 21-25.

The Applicants submit that neither the third paragraph of page 108 nor the abstract of Hong discloses a control system design tool connected to the shift controller for inputting the shift control algorithm and for outputting a hydraulic pressure supply command such that the hydraulic pressure supply command is supplied to the hydraulic actuator through the hydraulic circuit based on a shift signal from shift control algorithm, as recited in claim 1.

Moreover, regarding the Office Action's assertion that Hong discloses hydraulic circuits and actuator by elements 20 and 23-25 of Fig. 1, it is respectfully noted that Fig. 1 of Hong does not have elements 20 and 23-25, nor does any other figure of Hong. Regarding the hydraulic pressure, Hong discloses only that the dynamics of hydraulic

circuits are complicated, and therefore, are not shown. In addition, Hong does not disclose a relationship between the shift stage and a pressure profile.

Furthermore, neither Hong nor Iizuki discloses or suggests at least a second simulator section with a second model. In addition, neither Hong nor Iizuki discloses or suggests at least a feature wherein the second simulator section simulates and evaluates the shift control algorithm based on a third model obtained by incorporating the second model with the first model.

For at least these reasons, the Applicants submit that none of the applied art of record, nor combination thereof, discloses or suggests at least the combination of a simulator for simulating a shift control algorithm stored in a shift controller of an automatic transmission mounted on a vehicle, including a control system design tool connected to the shift controller for inputting the shift control algorithm and for outputting a hydraulic pressure supply command such that the hydraulic pressure supply command is supplied to the hydraulic actuator through a hydraulic circuit based on a shift signal from the shift control algorithm; a first simulator section connected to the control system design tool for inputting the hydraulic pressure supply command and for estimating an effective hydraulic pressure generated in the hydraulic actuator in response to the hydraulic pressure supply command based on a first model; and a second simulator section connected to the control system design tool and to the first simulator section for determining transfer functions of a second model describing behavior of the hydraulic actuator such that an output of the second model converges with the estimated effective hydraulic pressure, wherein the second simulator section

simulates and evaluates the shift control algorithm based on a third model obtained by incorporating the second model with the first model, as recited in claim 1.

For at least this reason, the Applicants submit that claim 1 is allowable over the applied art of record. As claim 1 is allowable, the Applicant submits that claims 2-6, which depend from allowable claim 1, are likewise allowable for at least the reasons set forth above with respect to claim 1.

Claims 7 and 12

In the Applicants' invention as recited in claim 7, a parameter extracting means is provided for extracting a parameter having influence on the characteristics when durability of the transmission is degraded. An undesirable shift phenomenon forecasting means is provided for conducting simulation based on a model while changing the parameter and forecasting occurrence of undesirable phenomenon using the value based on behavior change of the model. An algorithm correcting means is provided for correcting the shift control algorithm based on a result of forecasting such that the forecasted occurrence of undesirable phenomenon disappears.

In the Applicants' invention as recited in claim 12, a second simulator section is connected to the control system design tool and to the first simulator section for determining transfer functions of a second model describing behavior of the hydraulic actuator such that an output of the second model converges with the estimated effective hydraulic pressure. The second simulator section simulates and evaluates the shift control algorithm based on a third model obtained by incorporating the second model with the first model. The second simulator section includes a parameter extracting means for extracting a parameter having influence on the characteristics when durability

of the transmission is degraded. An undesirable shift phenomenon forecasting means is provided for conducting simulation based on the third model while changing the parameter and forecasting occurrence of undesirable phenomenon using the value based on behavior change of the third model. An algorithm correcting means is provided for correcting the shift control algorithm such that the forecasted occurrence of undesirable phenomenon disappears.

The Office Action asserts that Iizuka teaches a transmission characteristic analyzing means for analyzing characteristics of the transmission when shift is conducted in accordance with the shift control algorithm through a value to determine deviation of the characteristics from a predetermined standard; parameter extracting means for extracting a parameter having influence on the characteristics when durability of the transmission is degraded by "deviation analysis between the actual shifting period and target shifting period" and by 'parameter extraction means' to measure/derive the shift period difference (Iizuka: Col.6 Lines 30-49; Col.5, Lines 46-59). Iizuka `188 teaches that the shifting period have impact on the shift shock and hence durability of the transmission (Iizuka: Col.1, Lines 21-36). Hence parameter extraction means to get the correct shifting period can be extracted from the system (model) based on the learning system (Iizuka: Fig.1, Elements 26-28)." *Office Action,* p. 16, lines 12-22.

Thus, the Office Action asserts that the actual shifting period of Iizuka corresponds to the claimed characteristics of the transmission, and the time difference between the actual shifting period and a target shifting period of Iizuka corresponds to the claimed deviation of the characteristics from a predetermined standard. However, the Office Action also interprets the shift period time difference as the claimed

parameter that has influence on the characteristics when durability of the transmission is degraded.

The Applicants respectfully submit that the time difference between the actual shifting period and the target shifting period of Iizuka cannot satisfy both the value to determine deviation of the characteristics from a predetermined standard and the parameter that affects the characteristics recited in claims 7 and 12.

Moreover, according to the Office Action, Iizuka discloses the claimed parameter extracting means at col. 1, lines 21-36 thereof. However, beginning at col. 1, line 20, Iizuka discloses a preventing shift shock from increasing due to fluctuation of shifting performance of...due to tolerance in spool valves, springs and so on... However, Iizuka neither discloses nor suggests parameter extracting means for extracting a parameter having influence on the characteristics when durability of the transmission is degraded.

The Office Action further asserts that Yoon teaches "transmission characteristic analyzing means." However, Yoon teaches only a varying friction coefficient, and is not concerned with a durability drop due to aging.

Furthermore, the Office Action asserts that Yoon discloses an algorithm correcting means. However, Yoon merely discloses in section labeled "5.3 Robustness Analysis Results for Uncertainty in Friction," that "shift quality is seen to degrade as the friction coefficient moves away from the nominal value in clutch C1. Of interest is that variations of +/-15% in the friction coefficient of clutch do not have a significant impact on shift quality." Yoon neither discloses nor suggests correcting the shift control algorithm by the simulation result, or even that such correction is necessary.

For at least these reasons, the Applicants submit that none of the applied art of record, nor combination thereof, discloses or suggests at least the combination of a simulator having computer-aided design programs for simulating a shift control algorithm stored in a shift controller of an automatic transmission mounted on a vehicle, including transmission characteristic analyzing means for analyzing characteristics of the transmission when shift is conducted in accordance with the shift control algorithm through a value to determine deviation of the characteristics from a predetermined standard; parameter extracting means for extracting a parameter having influence on the characteristics when durability of the transmission is degraded; undesirable shift phenomenon forecasting means for conducting simulation based on a model, while changing the parameter and forecasting occurrence of undesirable phenomenon using the value based on behavior change of the model; and algorithm correcting means for correcting the shift control algorithm based on a result of forecasting such that the forecasted occurrence of undesirable phenomenon, as recited in claim 7.

In addition, the Applicants submit that none of the applied art of record, nor combination thereof, discloses or suggests at least the combination of a second simulator section connected to the control system design tool and to the first simulator section for determining transfer functions of a second model describing behavior of the hydraulic actuator such that an output of the second model converges with the estimated effective hydraulic pressure, the second simulator section simulates and evaluates the shift control algorithm based on a third model obtained by incorporating the second model with the first model, wherein the second simulator section includes: transmission characteristic analyzing means for analyzing characteristics of the

transmission when shift is conducted in accordance with the shift control algorithm through a value to determine deviation of the characteristics from a predetermined standard; parameter extracting means for extracting a parameter having influence on the characteristics when durability of the transmission is degraded; undesirable shift phenomenon forecasting means for conducting simulation based on the third model, while changing the parameter and forecasting occurrence of undesirable phenomenon using the value based on behavior change of the third model; and algorithm correcting means for correcting the shift control algorithm such that the forecasted occurrence of undesirable phenomenon disappears, as recited in claim 12.

For at least these reasons, the Applicants submit that claims 7 and 12 are allowable over the applied art of record. As claims 7 and 12 are allowable, the Applicants submit that claims 8-11, which depend from allowable claim 7, and claims 13, and 15-17, which depend from allowable claim 12, are likewise allowable for at least the reasons set forth above with respect to claims 7 and 12.

Claims 18, 24 and 19

Claims 18, 24 and 29 recite method claims corresponding to the structure recited in claims 1, 7 and 12, respectively.

Thus, the Applicants submit that claims 18, 24 and 29 are allowable for at least the reasons set forth above with respect to claims 1, 7 and 12, respectively.

Claims 19-23 depend from claim 18, claims 25-28 depend from claim 24, and claims 30, 32-34 depend from claim 29. The Applicants submit that these claims are allowable for at least the reasons set forth above with respect to claims 18, 24 and 29, respectively.

Conclusion

For all of the above reasons, it is respectfully submitted that claims 1-34 are in condition for allowance and a Notice of Allowability is earnestly solicited.

Should the Examiner determine that any further action is necessary to place this application into better form, the Examiner is invited to contact the undersigned representative at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants hereby petition for an appropriate extension of time. The Commissioner is hereby authorized to charge any fee deficiency or credit any overpayment associated with this communication to Deposit Account No. 01-2300 referencing client matter number 107101-00034.

Respectfully submitted,

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Enclosures: